POM-12402/29
12607sh

1. A method of fabricating a component having improved properties, comprising the steps of:

a) providing a substrate having a surface; and

b) depositing a layer of a material onto at least a portion of the surface of the substrate using a laser-assisted direct metal deposition process, wherein, compared to the substrate, the layer of material exhibits:

improved resistance to wear, corrosion, or oxidation,

improved thermal conduction,

greater density, or

a different phase.

2. The method of claim 1, wherein the material of the layer is specifically chosen to promote a phase which is different from that of the substrate.

3. The method of claim 1, further including the step of using non-equilibrium synthesis to dissolve a low-solubility material into the layer of material to increase its hardness.

4. The method of claim 1, wherein the step of providing a substrate having a surface includes the step of using direct metal deposition to build the substrate on an incremental basis.

5. The method of claim 1, wherein the substrate and layer comprise a die, mold or other tool.

6. The method of claim 1, further including the step of applying the layer of material using a robotic, closed-loop DMD arrangement.

7. A method of fabricating a component having improved properties, comprising the steps of:

a) providing a computer-aided design (CAD) description of the component to be fabricated;

b) using a laser-assisted, direct metal deposition (DMD) process in accordance with the CAD description to substantially fabricate the component having an outer surface; and

c) depositing a layer of a material having a desired characteristic onto at least a portion of the surface of the component, also using a laser-assisted direct metal deposition process.

8. The method of claim 7, wherein the layer of material exhibits improved wear resistance relative to the component.

9. The method of claim 7, wherein the layer of material is more thermally conductive than the component itself.

10. The method of claim 7, wherein the layer of material is more thermally conductive than the component itself.

11. The method of claim 7, wherein the layer of material has a density greater than that of the component itself.

12. The method of claim 7, wherein the layer of material is more resistant to corrosion than the component itself.

13. The method of claim 7, wherein the layer of material is more resistant to oxidation than the component itself.

14. The method of claim 7, wherein the layer of material has a phase which is different from that of the component itself.

15. The method of claim 14, further including the step of choosing the material of the layer to promote a phase which is different from that of the substrate.

16. The method of claim 7, further including the step of using non-equilibrium synthesis to dissolve low a solubility material into the layer of material to increase hardness.

17. The method of claim 7, wherein the component is a die, mold or other tool.

18. The method of claim 7, further including the step of applying the layer of material using a robotic closed-loop DMD arrangement.

19. The method of claim 7, further including the step of incorporating one or more conformal cooling channels within the component during its fabrication.

20. The method of claim 7, further including the step of incorporating one or more conductive heat sinks or thermal barriers during its fabrication.